



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/651,476	08/30/2000	Yang Gao	10932/163	1086
25700	7590	03/30/2004	EXAMINER	
FARJAMI & FARJAMI LLP 26522 LA ALAMEDA AVENUE, SUITE 360 MISSION VIEJO, CA 92691			NOLAN, DANIEL A	
		ART UNIT	PAPER NUMBER	
		2654		
DATE MAILED: 03/30/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/651,476	GAO, YANG	
	<b>Examiner</b>	<b>Art Unit</b>	
	Daniel A. Nolan	2654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 30 August 2000.  
 2a) This action is **FINAL**.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-26 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-26 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 30 August 2000 is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
	6) <input type="checkbox"/> Other: _____

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description:

- 229, 235, 240, 242 & 244 (figure 2) are not specified.
- 300 & 301 (figure 3) are not specified.
- 400 & 430 (figure 4) are not specified.

A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Specification***

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification, such as:

- "Suppression" is misspelled (page 12 line 4).
- "Weighting" is misspelled (page 17 line 14).

Art Unit: 2654

- Hyphenate "look-ahead" (page 18 line 1) to be consistent (with page 21 line 22).
- "Classification" is misspelled (page 20 line 15).
- "Calculation", "parameters", "lowering", "theoretically", "unmodified", "theoretical" & "extremes" are misspelled (page 22 lines 10-11, 13, 16-18 & 20).
- "Parameters" (lines 13, 15 & 18) and "processor" (line 14) are misspelled (page 23).

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested:

"Noise Suppression in the Frequency Domain by Adjusting Gain according to Voicing Parameters".

### **Claim Objections**

4. Claims 4, 5, 7, 13, 14, 16 and 25 are objected to because of the following informalities:

- "Frequency" is misspelled (1<sup>st</sup> lines claims 7 & 16).
- The variables of the formulae in claims 4, 5, 13, 14 and 25 must be defined in the claims. The Examiner is proceeding with the understanding that the symbols represent voicing parameters to adjust the gain (page 24 lines 8-11).

Appropriate correction is required.

5. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

- Claims 8, 9, 11, 12, 20, 21, 23, 24 and 26 refer to processing a *portion* of a signal, but the only *portion* specified is the *look-ahead* recycled (page 21 line 19).
- The Examiner is proceeding with the understanding that the term *portion* in the claims indicate the components of a signal such as one of a number of channels, or a frame, subframe, segment, window or other division of a signal, delineated for processing.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Borth et al**

7. Claims 1, 3, 6, 7, 17 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Borth et al (U.S. Patent 4,628,529 A).

8. Regarding claims 1 and 17, Borth et al, with the invention for a *noise suppression system*, reads on every feature of the claim for *suppressing noise in a signal* as follows:

Art Unit: 2654

- Borth et al reads on the step of *estimating a signal to noise ratio for the signal* (310 in figure 5);
- Borth et al reads on the step of *classifying the signal to a classification* (570 in figure 5 – see column 10 lines 14-15);
- Borth et al reads on the step of *calculating a gain for the signal using the signal to noise ratio & classification* (column 9 lines 4-20 – see column 10 lines 34-35); and
- Borth et al reads on the step of *modifying the signal using the gain* (250, figures 2-5).

9. Regarding claim 3, the claim is set forth with the same limits as claim 1.

Borth et al reads on the feature where the *signal is one channel of a plurality of channels of a speech signal* (210 in figures 2-5).

10. Regarding claim 6, the claim is set forth with the same limits as claim 1.

Borth et al reads on the feature where the *signal is in a time domain, and the method further comprises a step of converting the signal from the time domain to a frequency time prior to the estimating step* (column 4 lines 15-17).

11. Regarding claims 7 and 19; the claims are set forth with the same limits as claims 1 and 17, respectively. Borth et al reads on the feature where the *signal is in a frequency domain, further comprising a step of converting the signal from the frequency domain to a time domain after the modifying step* (column 4 lines 32-36).

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Borth et al & Chan et al**

13. Claims 2 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Borth et al in view of Chan et al (U.S. Patent 5,812,970 A).

14. Regarding claims 2 and 18; the claims are set forth with the same limits as claims 1 and 17, respectively. Borth et al operates in high- and low-frequency domains but does not further speak on the subject to the degree that would address *pitch correlation*. Chan et al, with the invention of a *method based on pitch-strength for reducing noise in predetermined sub-bands of a speech signal* reads on the *step of estimating a pitch correlation for the signal* (column 15 lines 21-26), where the *calculating step further uses the pitch correlation* (claims 6 & 7, lines 24-27 & 11-12).

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Chan et al to the device/method of Borth et al to separate an input signal into selected frequency channels.

**Borth et al & Noso et al**

15. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Borth et al in view of Noso et al (U.S. Patent 4,532,648 A).

16. Regarding claims 4 and 5 as understood by the Examiner; the claims are set forth with the same limits as claims 1 and 2, respectively. Borth et al does not mention altering the gain to accommodate voice/unvoiced signals. Noso et al, with the invention of a *speech recognition system for an automotive vehicle*, reads on the feature where the *calculating step calculates the gain based on* (a formula), and where (a variable) is *adjusted according to the classification* (column 10 lines 29-31 & column 11 lines 9-11).

With regard to the further limitation of claim 5, Noso et al discloses where (a variable) is *adjusted according to the pitch correlation* (for different frequencies, column 3 lines 46-53). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Noso et al to the device/method of Borth et al so as to a consistent and level (nearly flat) speech signal as input to recognition.

**Chan et al & Borth et al**

17. Claims 8-12, 15-16, 20-24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al in view of Borth et al.

Art Unit: 2654

18. Regarding claims 8 and 20, Chan et al reads on the feature of *suppressing noise in a signal having a 1<sup>st</sup> portion and a 2<sup>nd</sup> portion* (from 1 and 22 in figure 1) and on the steps as follows:

- Chan et al reads on the step of *computing a voicing parameter using the 1<sup>st</sup> portion* (31 in figure 1);
- Chan et al reads on the step of *estimating a signal to noise ratio for the 2<sup>nd</sup> portion* (22→2→3→4→26 in figure 1);
- Chan et al reads on the step of *calculating a gain for the 2<sup>nd</sup> portion using the signal to noise ratio and the voicing parameter* (7 in figure 1); and  
Chan et al does not modify the signal by the gain except in the codec phase.

Borth et al reads on the step of *modifying the signal using the gain* (250, figures 2-5).

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Borth et al to the device/method of Chan et al to generate a clean speech signal by spectral gain modification.

19. Regarding claims 9 and 21; the claims are set forth with the same limits as claims 8 and 20, respectively. Chan et al reads on the feature where the *1<sup>st</sup> portion of the signal is ahead of the 2<sup>nd</sup> portion in a time domain* (depicting 22→2→3 in figure 1).

20. Regarding claims 10 and 22; the claims are set forth with the same limits as claims 8 and 20, respectively. Chan et al teaches the feature where the *voicing parameter is computed by a speech coder* (as a *neural network* of column 3 lines 2-5).

21. Regarding claims 11 and 23; the claims are set forth with the same limits as claims 8 and 20, respectively. Chan et al teaches the feature where the *voicing parameter is a speech classification of the 1<sup>st</sup> portion* (22→2→3→4→31 in figure 1).

22. Regarding claims 12 and 24; the claims are set forth with the same limits as claims 8 and 20, respectively. Chan et al teaches the feature where the *voicing parameter is a pitch correlation of the 1<sup>st</sup> portion* (36 in figure 1 – see column 15 lines 43-46).

23. Regarding claim 15, the claim is set forth with the same limits as claim 8. Chan et al teaches the feature where the *signal is in a time domain, and the method further comprises a step of converting the signal from the time domain to a frequency time prior to the estimating step* (3→4 in figure 1).

24. Regarding claims 16 and 26; the claims are set forth with the same limits as claims 8 and 20, respectively. Chan et al teaches the feature where the *signal is in a frequency domain, and the method further comprising a step of converting the signal from the frequency domain to a time domain after the modifying step* (11 in figure 1).

**Chan et al, Borth et al & Noso et al**

25. Claims 13-14 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al in view of Borth et al and further in view of Noso et al.

26. Regarding claims 13, 14 and 25 as understood by the Examiner; claims 13 & 14 are set forth with the same limits as claim 8 and claim 25 is set forth with the same limits as claim 20. Neither Chan et al nor Borth et al mention altering the gain to accommodate voice/unvoiced signals. Noso et al, with the invention of a speech recognition system for an automotive vehicle, reads on the feature where the calculating step calculates the gain based on (a formula), and where (variables) are adjusted according to the voicing parameter (column 10 lines 29-31 & column 11 lines 9-11).

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method and/or teachings of Noso et al to the device/method of Chan et al & Borth et al so as to a consistent and level (nearly flat) speech signal as input to recognition.

***Conclusion***

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Mauro (U.S. Patent 6,122,384 A) Noise suppressor used in speech processing systems, w/ gain adjuster for each frequency channel when speech is detected.
- Chandran et al (U.S. Patent 6,523,003 B1) interdependent spectral gain adjustment.
- Gerson et al (U.S. Patent 5,528,723 A) speech coding w/harmonic noise weighting - determining periodicity in input speech signal, and generating modified reconstruction error signal based on harmonic noise weighting w/periodicity.
- Turner et al (U.S. Patent 4,704,730 A) multi-state speech codec w/noise reduction.
- Rao et al (U.S. Patent 5,794,199 A) discontinuous transmission (telephony) speech coding detects voice activity in frame-segmented input signal, computes noise-frame weighted average and transmits comfort noise.

28. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Daniel A. Nolan at telephone (703) 305-1368 whose normal business hours are Mon, Tue, Thu & Fri, from 7 AM to 5 PM.

If attempts to contact the examiner by telephone are unsuccessful, supervisor Richemond Dorvil can be reached at (703)305-9645.

The fax phone number for Technology Center 2600 is (703)872-9314. Label informal and draft communications as "DRAFT" or "PROPOSED", & designate formal

Art Unit: 2654

communications as "EXPEDITED PROCEDURE". Formal response to this action may be faxed according to the above instructions,

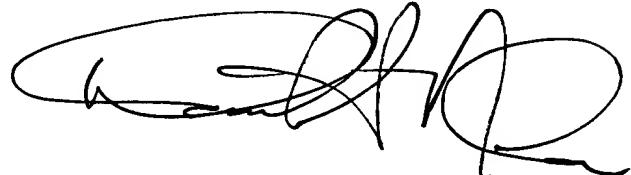
or mailed to: P.O. Box 1450  
Alexandria, VA 22313-1450

or hand-deliver to: Crystal Park 2,  
2121 Crystal Drive, Arlington, VA,  
Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to Technology Center 2600 Customer Service Office at telephone number (703) 306-0377.

Daniel A. Nolan  
Examiner  
Art Unit 2654

DAN/d  
March 23, 2004



DANIEL NOLAN  
PATENT EXAMINER